

### **REMARKS/ARGUMENTS**

Claims 37-44 and 46 are pending in this application.

Claims 37, 39, and 40 have been amended for clarity as indicated hereinabove.

Claim 39 had been rejected under 35 U.S.C. § 112, second paragraph. The amended Claim 39 is supported, for example, by paragraphs [0013] and [0061] of the Specification as filed; no new matter has been introduced. Applicants believe that Claim 39 as amended is now in compliance with 35 U.S.C. § 112, second paragraph.

Claims 37-39 and 46 had been rejected under 35 U.S.C. § 103(a) over Schneider et al. (US 4,834,793). This rejection is respectfully traversed for the following reasons.

Claims 37-39 and 46 comprise constantly neutralizing sulfuric acid produced in an oxidation reactor using an acidity neutralizer to an acidity level at which no formation of elementary sulfur occurs in the oxidation reactor.

Schneider does not teach this element. Contrary to this element, Schneider teaches transferring sulfuric acid from the reactor 10, where ore oxidation takes place, to the precipitator 40; the ore is not oxidized in the precipitator 40; the precipitator 40 is not an oxidation reactor.

Nothing is done in Schneider to prevent formation of elementary sulfur in the oxidation reactor 10, where ore sulfides are “oxidized by the nitric acid at least to elemental sulfur and including those higher oxidation species up to sulfate” (col. 1, lines 63-67).

On page 5 of the pending Office Action, Examiner states that Schneider teaches “that the exiting slurry from the neutralization step ‘can contain’ sulfur (col. 8 lines 39-43), but does not teach that it necessarily must form.” The cited part of Schneider describes the slurry exiting the precipitator 40, where no oxidation of ore takes place; this part of Schneider does not refer to any steps designed to prevent formation of elementary sulfur in the oxidation reactor 10.

Claims 37-39 and 46 comprise transferring NO from the oxidation reactor into a regeneration oxidizer; regenerating  $\text{N}_2\text{O}_3$  from the transferred NO using air or oxygen in the regeneration oxidizer; and transferring the regenerated  $\text{N}_2\text{O}_3$  into the oxidation reactor.

On pages 5-6 and 9-10 of the pending Office Action, Examiner states that Schneider teaches “that regeneration primarily takes place in the reactor 10 (col. 10, lines 7-10), but acknowledges that regeneration may be carried out in a separate chamber” (col. 4, lines 58-68, to col. 5, lines 1-4) and that “the products of the regeneration step are returned to the slurry in reactor 10 (col. 4, lines 13-16; col. 7, lines 49-53).”

However, the “regeneration” taught by Schneider and cited by Examiner is not the regeneration of  $\text{N}_2\text{O}_3$  from the transferred NO using air or oxygen in the regeneration oxidizer of Claims 37-39 and 46.

By “regeneration” Schneider means nitric acid regeneration, as Schneider makes clear, for example, in col. 4, lines 17-27 (immediately following Examiner’s citation):

“Nitric acid regeneration may written as follows:

$3 \text{ NO} + 3/2 \text{ O}_2 \rightarrow 3 \text{ NO}_2$  (fast)

$3 \text{ NO}_2 + \text{H}_2\text{O} \rightarrow 2 \text{ HNO}_3 + \text{NO}$  (rate limiting)

$2 \text{ NO} + 3/2 \text{ O}_2 + \text{H}_2\text{O} \rightarrow 2 \text{ HNO}_3$

The regeneration of nitric acid from  $\text{NO}_2$  and NO requires oxygen and water.”

Col. 4, lines 58-68, to col. 5, lines 1-4, cited by Examiner also make clear that by “regeneration” Schneider means  $2 \text{ NO} + 3/2 \text{ O}_2 + \text{H}_2\text{O} \rightarrow 2 \text{ HNO}_3$  and not the regeneration of  $\text{N}_2\text{O}_3$  from the transferred NO using air or oxygen in the regeneration oxidizer of Claims 37-39 and 46.

And col. 7, lines 49-53, of Schneider cited by Examiner reads: “The recycle of nitric acid is much more efficiently accomplished using this agitation format than would be the case if the  $\text{NO}_2$  containing gas were bubbled through the aqueous phase.” By “this format” Schneider means: “The NO produced in the oxidation of the ore reacts with any oxygen in the reactor 10 to give  $\text{NO}_2$ . A steady contacting of the  $\text{NO}_2$  with water is

required to regenerate  $\text{HNO}_3$ .” Again, this is not the regeneration of  $\text{N}_2\text{O}_3$  from the transferred NO using air or oxygen in the regeneration oxidizer of Claims 37-39 and 46.

Contrary to Claims 37-39 and 46, Schneider does not mention regeneration of  $\text{N}_2\text{O}_3$  from the transferred NO using air or oxygen and does not suggest performing it outside of the oxidation reactor.

As explained hereinabove, the aforementioned elements of Claims 37-39 and 46 are not taught or suggested in Schneider. Therefore, Claims 37-39 and 46 are patentable and non-obvious over Schneider under 35 U.S.C. § 103(a) and should be allowed.

Claims 40 and 41 had been rejected under 35 U.S.C. § 103(a) over Schneider and further in view of Somers et al. (US 2,315,988). This rejection is respectfully traversed for the following reasons.

Claims 40 and 41, as amended, comprise separating  $\text{N}_2\text{O}_3$  from  $\text{N}_2$  by absorbing the  $\text{N}_2\text{O}_3$  from a mix of gases comprising  $\text{N}_2$  and  $\text{N}_2\text{O}_3$  into a sulfuric acid solution and releasing  $\text{N}_2\text{O}_3$  from the sulfuric acid solution before transferring the regenerated  $\text{N}_2\text{O}_3$  into the oxidation reactor.

On page 10 of the pending Office Action, Examiner states that “once the nitrogen oxide and nitrogen gases recited in the claim are exposed to the sulfuric acid and copper denitrating substances, the separation of the nitrogen oxide gas from the nitrogen gas would be expected to occur due to inherent nature of the chemical reaction. Therefore, separation is implied by the processes of the prior art on record”.

However, neither Schneider nor Somers teaches exposing a mix of gases comprising  $\text{N}_2$  and  $\text{N}_2\text{O}_3$  to a sulfuric acid solution before transferring the regenerated  $\text{N}_2\text{O}_3$  into the oxidation reactor. In Schneider, both  $\text{N}_2$  and  $\text{N}_2\text{O}_3$  come in contact with sulfuric acid only inside the oxidation reactor 10. In Somers, there is no mention of absorbing  $\text{N}_2\text{O}_3$ .

Neither Schneider nor Somers teach releasing  $N_2O_3$  from the sulfuric acid solution. Examiner acknowledges this with regard to Schneider (page 7 of the pending Office Action). In Somers there is no mention of  $N_2O_3$  being released; all nitrogen oxides in the sulfuric acid solution, according to Somers, are reduced to NO to form  $FeSO_4 \cdot NO$  complex before NO is stripped out of the complex and the sulfuric acid solution.

Therefore, Claims 40 and 41 are patentable and non-obvious over Schneider and Somers under 35 U.S.C. § 103(a) and should be allowed.

Furthermore, if an independent claim is non-obvious under 35 U.S.C. § 103, then any claim depending therefrom is non-obvious.<sup>1</sup> Claims 40 and 41 depend from non-obvious Claim 37 and therefore are non-obvious and should be allowed.

Claim 42 had been rejected under 35 U.S.C. § 103(a) over Schneider and further in view of Kamiyama et al. (US 4,999,173). Claims 43 and 44 had been rejected under 35 U.S.C. § 103(a) over Schneider in view of Kamiyama, and further in view of Kawasumi et al. (US 4,450,188). These rejections are respectfully traversed for the following reasons.

Claims 42-44 comprise separating NO from  $N_2$  by absorbing the NO from a mix of gases comprising  $N_2$  and NO into a monovalent copper salt solution and denitrating the monovalent copper salt solution using a dosed supply of compressed air.

Neither Schneider, nor Kamiyama, nor Kawasumi teach using a monovalent copper salt solution; and Kamiyama, cited by Examiner for its use of copper salts, teaches only dry methods and teaches against using solutions: “the wet methods are still not of practical use.” (col. 1, lines 22-23).

Such separating is not taught or suggested in Schneider, Kamiyama, Kawasumi, any other publication cited by the Examiner in this Office Action, or their combination. Therefore, Claims 42-44 are patentable and non-obvious over Schneider, Kamiyama, and Kawasumi under 35 U.S.C. § 103(a) and should be allowed.

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<sup>1</sup> In re Fine, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988).

Furthermore, if an independent claim is non-obvious under 35 U.S.C. § 103, then any claim depending therefrom is non-obvious.<sup>2</sup> Claims 42-44 depend from non-obvious Claim 37 and therefore are non-obvious and should be allowed.

It is believed that the present application is in condition for allowance. A Notice of Allowance is respectfully solicited in this case. Should any questions arise, the Examiner is encouraged to contact the undersigned.

Respectfully submitted,

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<sup>2</sup> In re Fine, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988).